SUN CCL-82 COIL, CONDENSER, AND CYLINDER LEAKAGE TESTER

OPERATING INSTRUCTIONS 119129

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TESTER INFORMATION

The Sun CCL-82 Tester adds coil, condenser, and cylinder leakage testing capability to testers that cannot currently perform these tests. The CCL-82 unit is mounted in a designated engine performance scope tester, and functions as a supplement to this tester.

HIGH VOLTAGE INFORMATION

HIGH VOLTAGE is present at the coil-condenser test leads during Condenser Leakage Tests. The CONDENSER TEST switch is designed to return automatically to the SERIES RES. position which discharges condensers charged during the Condenser Leakage Test.

When testing coils, HIGH VOLTAGE is present at the test leads and coil tower during Stress Tests only. The COIL TEST control automatically turns off the Stress Test when released.

CONDENSER TESTING

In order to function properly, and to insure good ignition, the condenser must have the following characteristics: minimum series resistance, minimum insulation leakage, and correct capacity.

CCL-82 Calibration

1. Turn on power switch for entire scope tester. The CCL-82 will be activated.
2. Connect Alligator clips of CCL-82's CONDENSER COIL TEST LEADS together.
3. After allowing approximately one minute for warm-up, adjust CONDENSER COIL CALIBRATOR until meter pointer rests on SET LINE.
4. Separate Test leads, and proceed with tests.

TEST CONNECTIONS

There are two ways that condensers may be tested — On-Vehicle and Off-Vehicle.

Off-Vehicle Connections

1. Connect Red CCL-82 Alligator clip positive (+) to condenser pigtail, and Black Alligator clip negative (—) to condenser case.

On-Vehicle Connections

1. When a condenser is to be tested On-Vehicle, the condenser must be electrically isolated from the rest of the system. Disconnect the distributor primary wire from the coil and block the ignition points open.
2. Connect CCL-82 Alligator Red Test clip to primary positive (+) terminal at the distributor, and CCL-82 Alligator Black Test clip to negative (—) distributor body ground (Fig. 1).

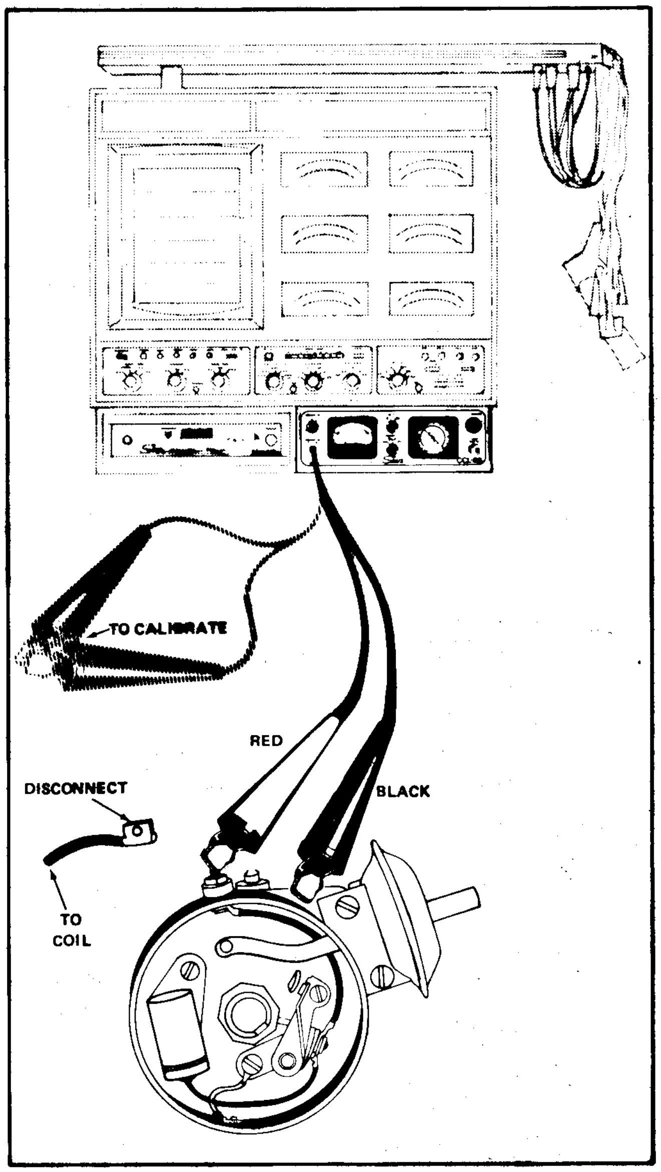


FIGURE 1 — CCL-82 on-vehicle SERIES RESISTANCE connections.

Test Procedures

1. With CONDENSER TEST switch to SERIES RES. position, reading should be in Black SERIES RES. Bar at right end of scale.
2. Move the condenser pigtail. If a deflection of the meter is noted, the pigtail is making poor contact (has excessive series resistance), and the condenser should be replaced.
3. On-Vehicle — If the reading is outside the Black SERIES RES. Bar, move the grounded

lead to the condenser body. If the reading improves, the condenser is not properly grounded to the distributor housing.

Leakage Test

1. Turn the CONDENSER TEST switch to LEAKAGE position.
2. If the condenser insulation is satisfactory, the meter reading should be in the Black LEAKAGE Bar at the left end of the scale.
3. If the meter reads outside the Black LEAKAGE Bar, the condenser insulation is not satisfactory, and the condenser should be replaced.

Capacity Test

1. Turn CONDENSER TEST switch to CAPACITY position.
2. Read Black scale of meter (0 to 1.0) for the microfarad capacity of the condenser being tested.
3. Refer to manufacturer's specifications for recommended condenser capacity.
4. If condenser capacity does not test within specifications, it should be replaced.

NOTE: If the condenser does not meet specifications while mounted in the distributor, remove the condenser and retest it. Follow the above steps. If the condenser tests "bad" in the distributor, but "good" on the bench, there is possibly a short or ground in the distributor primary circuit. Inspect the insulation of the distributor primary terminal and the internal circuit of the distributor.

IGNITION COIL TESTING

There are two types of Ignition Coil Tests, Resistance and Stress. The Resistance Test checks the primary and secondary windings. The Stress Test checks for shorts or breakdowns in the windings and insulation, while producing rated secondary output.

RESISTANCE TESTS OF IGNITION COIL WINDINGS

If Resistance Tests are to be made with the coil in the vehicle, the coil must be electrically isolated from the vehicle electrical system by disconnecting both primary leads from its terminals, and removing the secondary lead from the coil tower.

PRIMARY RESISTANCE TEST

NOTE: For this test, use Ohmmeter leads and Ohmmeter from designated tester.

1. Turn VOLT-OHM Selector switch to OHM position.
2. Connect VOLT-OHM leads together and calibrate Ohmmeter on main tester in X1 position.
3. Connect Red Ohmmeter lead to positive (+) primary terminal, and Black Ohmmeter lead to the negative (—) primary terminal (Fig. 2).
4. Observe ohmmeter readings, and compare with specifications.

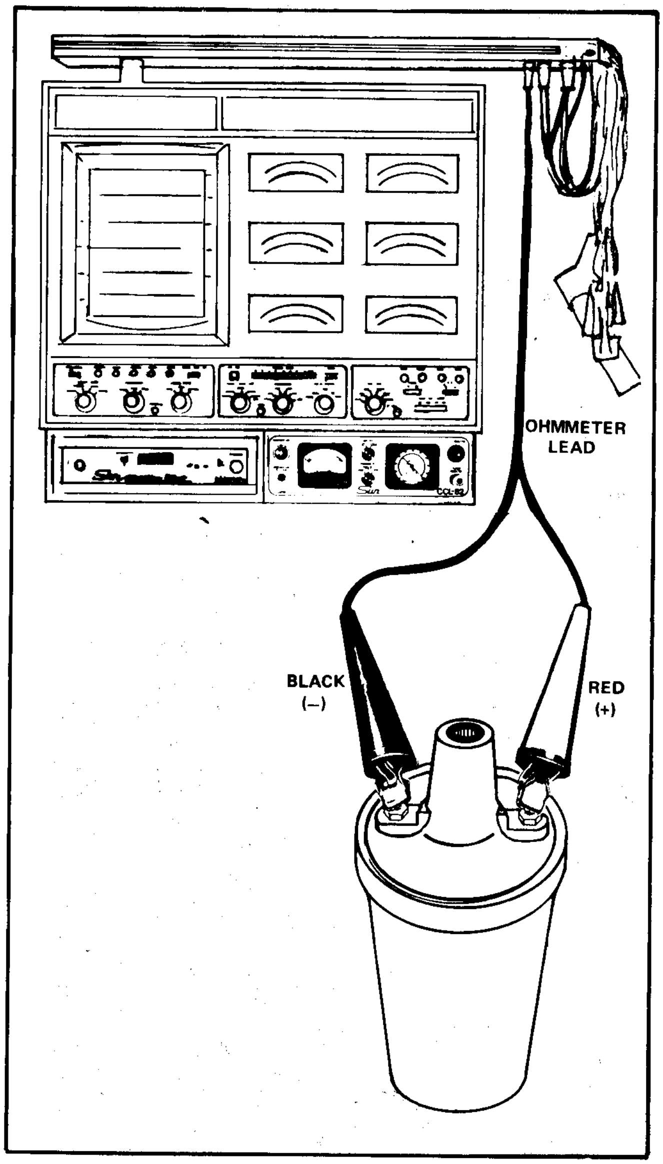


FIGURE 2 — PRIMARY RESISTANCE test connections.

Test Indications

GOOD: Primary Resistance within specifications.

BAD: Reading out of specifications. Check to see if coil is correct for vehicle application.

READING INFINITY: Primary winding open circuit (broken), replace coil.

SECONDARY RESISTANCE TEST

1. Turn OHM CONTROL knob to X1000 position, connect leads together, and calibrate ohmmeter.
2. Connect either Ohmmeter test clip to a Resistance Test Contact (RTC) or a small screwdriver, and hold in contact with metal terminal in center of secondary coil tower (Fig. 3).
3. Connect the other Ohmmeter lead to either primary terminal of the coil.
4. Note reading on Ohmmeter, and multiply reading by 1000.

Test Indications

GOOD: Reading within manufacturer's specifications.

BAD: Reading not within specifications, replace coil.

NOTE: Some coils do not connect Primary and Secondary together. In such cases, connect leads to Center Tower and Ground, or to both Secondary Terminals.

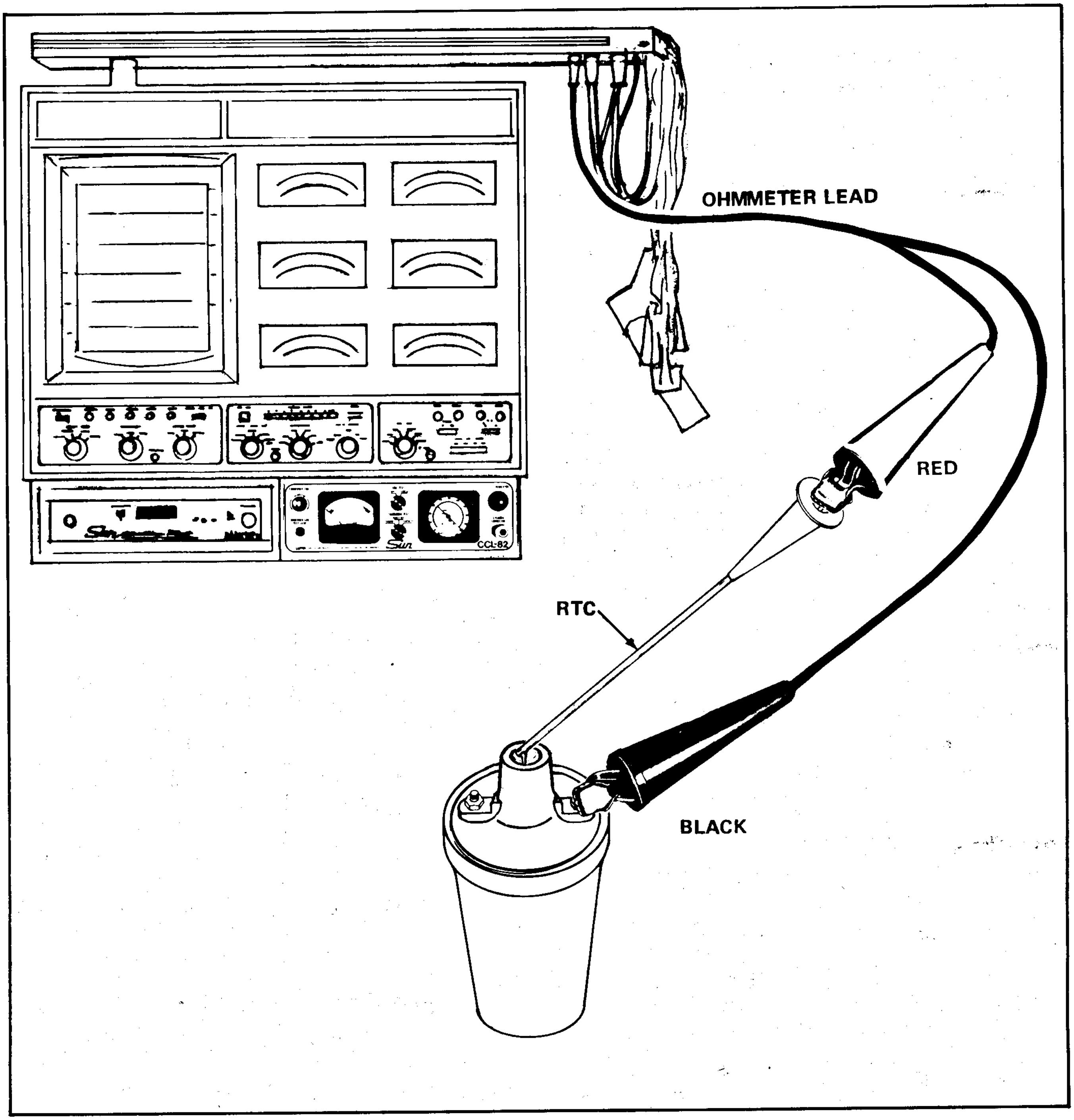


FIGURE 3 — SECONDARY RESISTANCE test connections.

PRIMARY GROUND TEST

1. Connect Red Ohmmeter lead to either coil primary terminal, and Black Ohmmeter lead to coil case.
2. Turn OHMS switch to OHMS position.
3. Ohmmeter should show no meter movement. Any meter movement will indicate a grounded primary winding.

STRESS TEST

Stress Test can be performed on or off the vehicle. For on-vehicle testing, the coil must be electrically isolated from the rest of the system. Isolate the coil by disconnecting both primary leads [plus (+) and minus (—)] from the coil terminals, and removing secondary wire from coil.

Scope And Tester Controls

Prepare the Scope and CCL-82 controls for both Conventional and GM HEI systems as follows:

1. Press PATTERN POSITION button to SHIFT and press Red CANCEL BUTTON on CYLINDER SELECTOR.
2. Turn FUNCTION SELECTOR knob to SECONDARY, PATTERN HEIGHT knob to HIGH, and PATTERN SELECTOR knob to SUPERIMPOSE position.
3. Turn IGNITION SELECTOR knob to the 1 or 2 position.
4. Turn VERTICAL control until Scope trace is on BASE LINE.
5. Rotate CCL-82 CONDENSER COIL CALIBRATOR completely counterclockwise.

Conventional Coil Connections

1. Connect Sun Coil Test adapter (#6002-0265) to coil secondary.
2. Clamp Chrome PATTERN PICKUP around Test adapter (#6002-0265) as close to center of adapter as possible.
3. Connect Black (Ground) PRIMARY PICKUP to coil case.
4. Connect Red CONDENSER COIL TEST LEAD to coil primary positive (+) terminal, and Black CONDENSER COIL TEST LEAD to coil primary negative (—) terminal (Fig. 4).

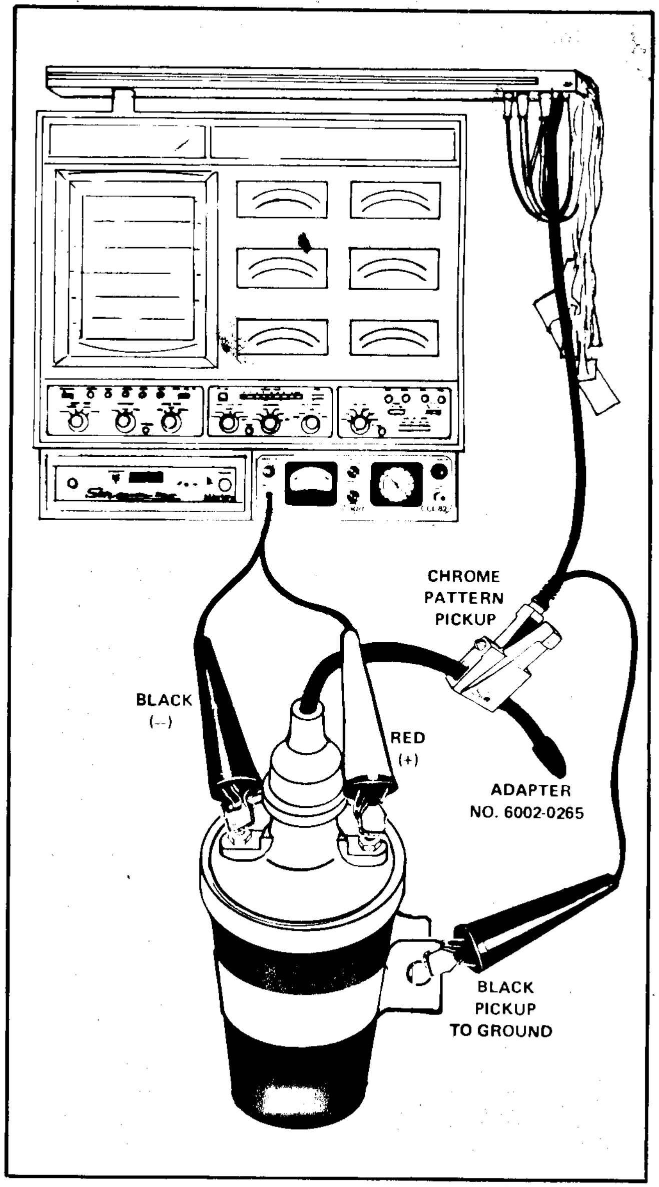


FIGURE 4 — STRESS TEST connections.

Coil Stress Test (Conventional System)

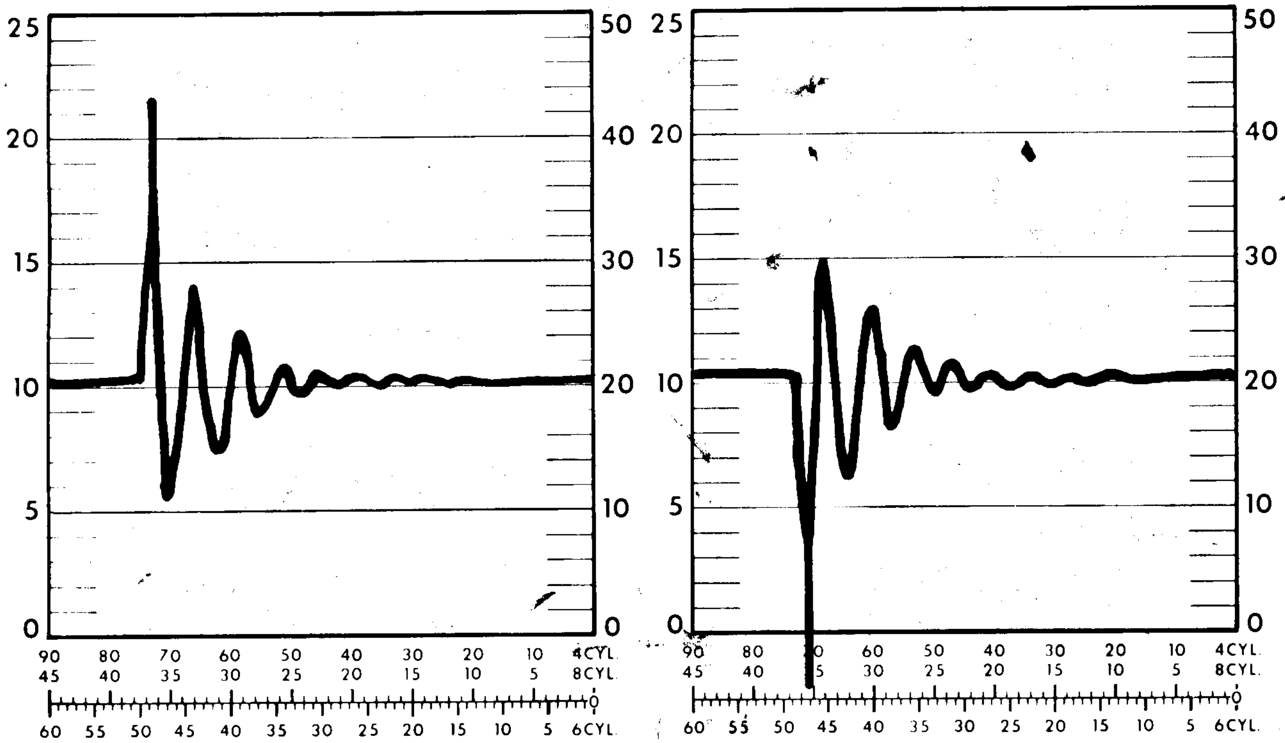
1. Turn and hold COIL TEST knob in STRESS position.
2. Rotate CONDENSER COIL CALIBRATOR knob clockwise until scope pattern reaches 25 KV or manufacturer's specifications.

   NOTE: Read Scope on right-hand side on 0-50 KV scale.

3. Observe waveform on scope, and compare to known good waveform (Fig. 5).

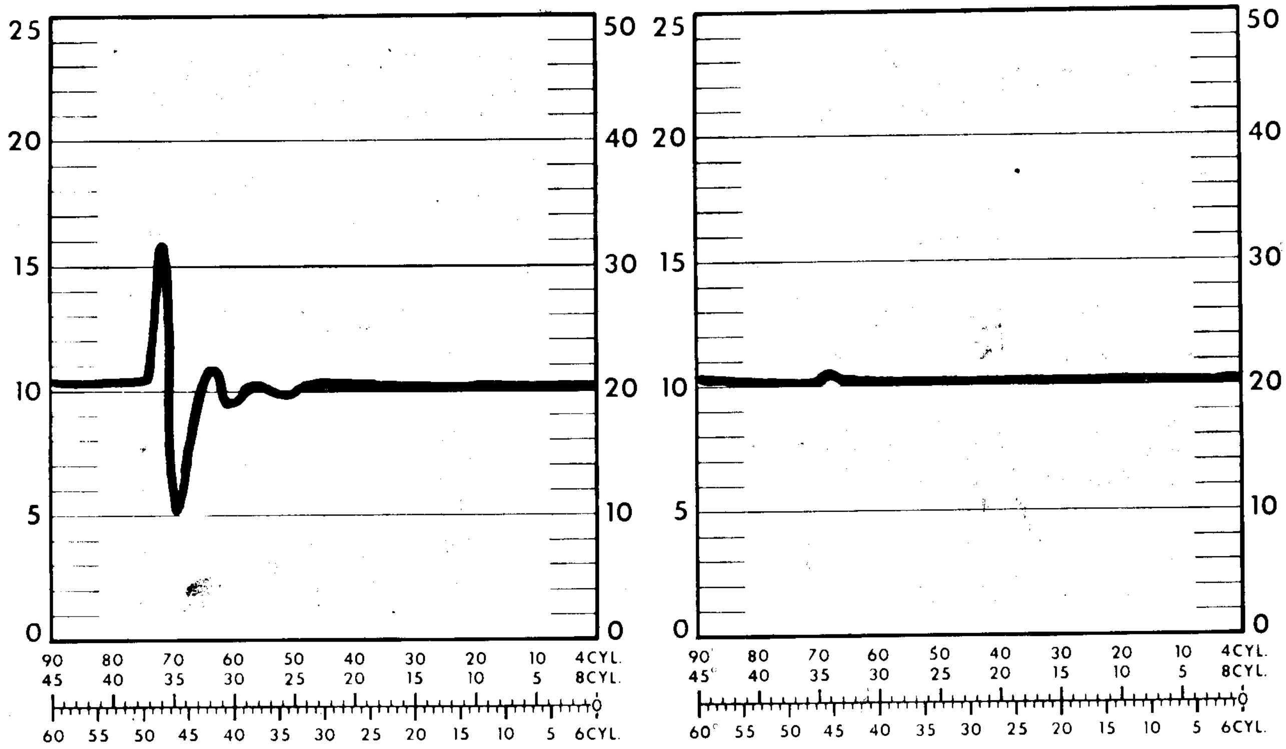
   NOTE: To observe lower portion of waveform, turn scope VERTICAL control clockwise until entire lower extent becomes visible.

   CAUTION: HIGH VOLTAGE is present at test lead whenever the STRESS or LEAKAGE positions are used.



A. Normal — waveform height meets or exceeds manufacturer's specifications and oscillations resemble those in illustration.

B. Reversed polarity — first oscillation extending downward instead of up.



C. Shorted — waveform is less than 20 KV and few oscillations are seen. Defective coil due to shorted windings or internal insulation breakdown.

D. Open — coil has open primary winding.

NOTE: 1. Waveform height is 20 KV or more, but pattern is "jittery," coil is defective due to internal insulation breakdown.

2. Some HEI systems will show no downspike. Compare with known good coils.

FIGURE 5 — Results of STRESS TEST.

General Motors Externally Mounted High Energy Ignition (HEI) Coil Test

1. For externally mounted coils, clamp the Chrome PATTERN PICKUP around the secondary coil wire (Fig. 6). Keep the end of the coil wire clear of Chrome PICKUP CLAMP and ground.
2. Connect Black PATTERN PICKUP (Ground) to coil mounting or coil case.
3. Using two (2) #6002-048 adapters, connect CCL-82 Red Test lead to coil ING. SW. terminal, and CCL-82 Black Test lead to coil TACH terminal.
4. Follow Coil Stress Test procedure.

NOTE: See manufacturer's specifications or Sun Specification Card.

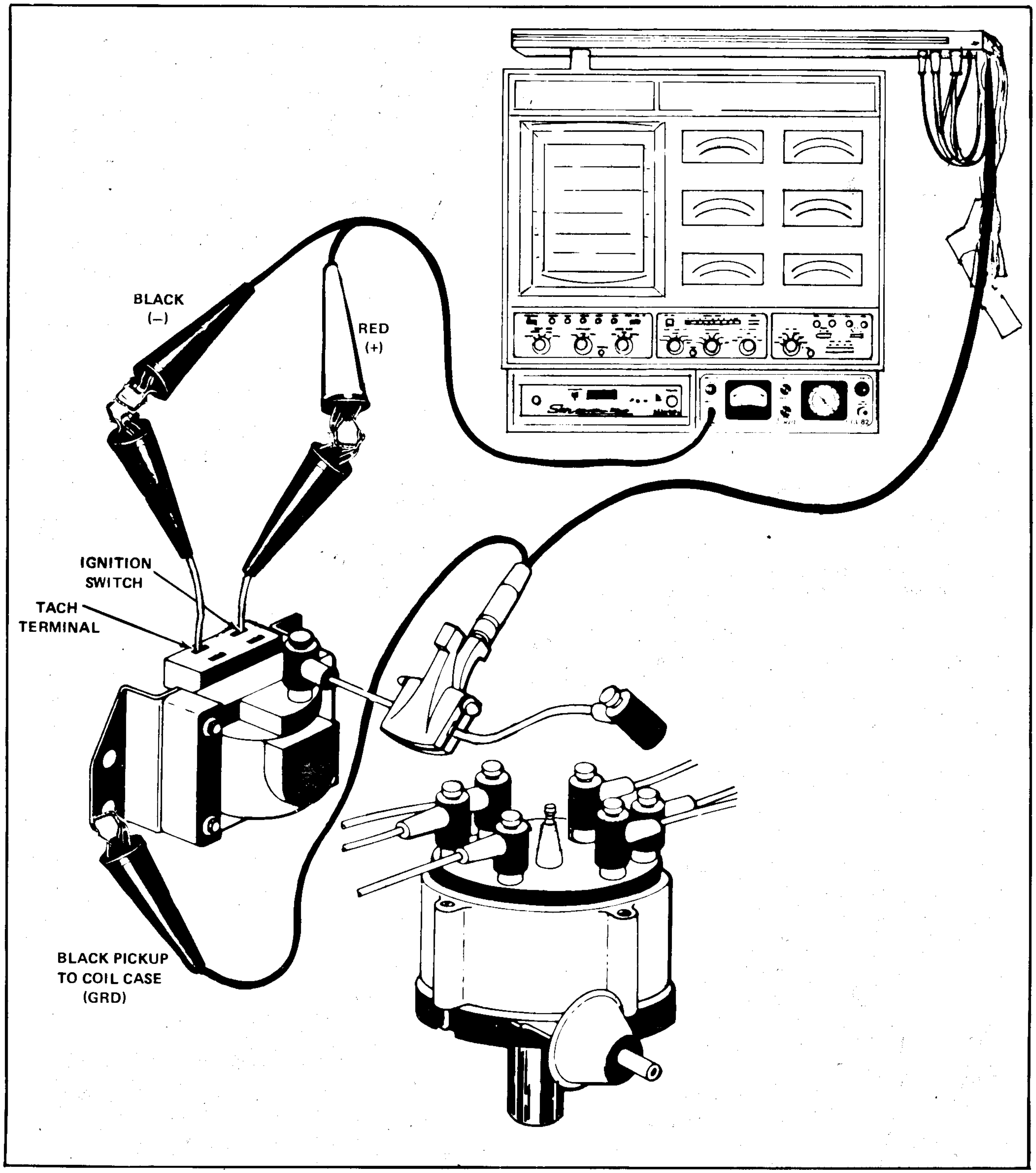


FIGURE 6 — Externally mounted HEI Coil Connections.

Tests Of HEI With Coil Mounted In Distributor Cap

1. Remove distributor cap and coil as a unit from vehicle.

2. Install HEI adapter on Blue Pickup lead.

3. Connect one 6002-048 lead to the TACH terminal of coil, one to the BAT terminal of coil, and one to the center terminal of the 3 spade connector (Fig. 7).

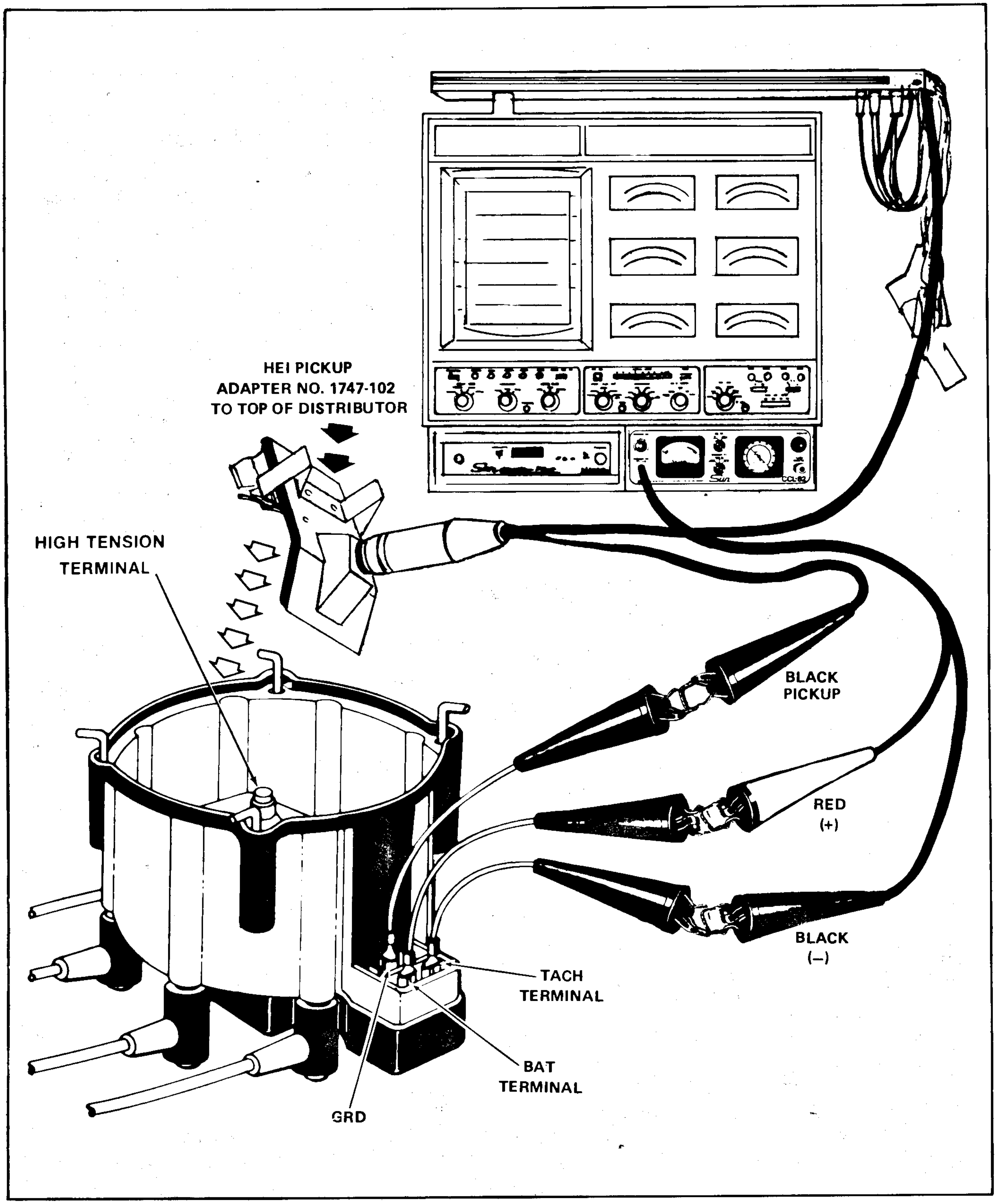


FIGURE 7 — Connections on HEI systems with internal coil.

4. Connect HEI adapter to coil (Fig. 8).

5. Connect CCL-82 Red Test lead to BAT 6002-048 lead, and CCL-82 Black Test lead to TACH 6002-048 lead.

6. Connect Black PRIMARY PATTERN lead to 6002-048 center lead of coil (Fig. 7).

7. Test Coil Output as outlined in COIL STRESS TEST.

NOTE: Minimum output on HEI coil is 35 KV.

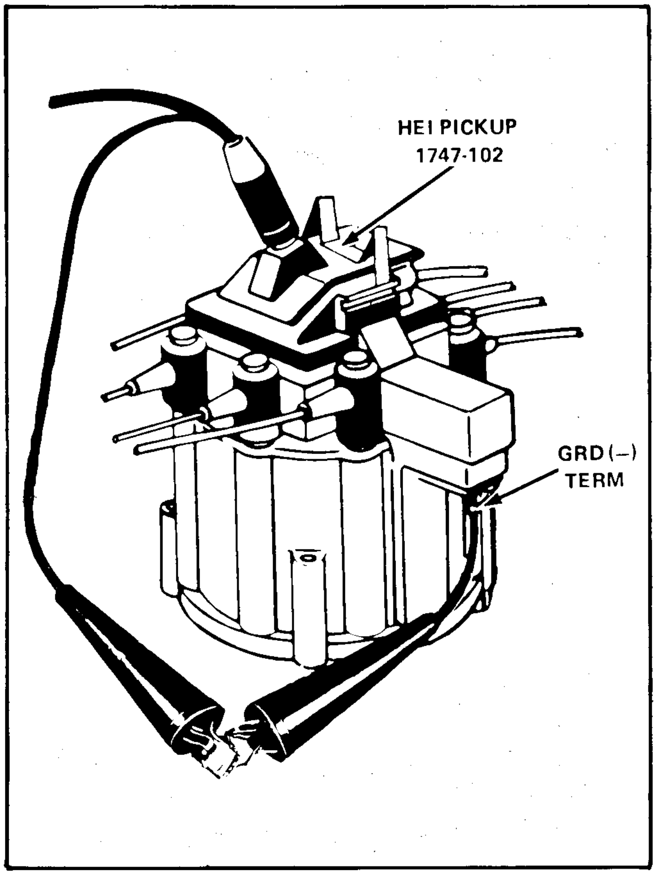


FIGURE 8 — HEI Pattern Pickup connections with internally mounted coil.

HEI COIL SECONDARY RESISTANCE TEST

1. Remove the distributor cap and wire as an assembly. (To avoid possible damage to the coil primary wires, test the coil without removing it from the distributor cap.)

2. Coils with isolated secondary, connect the ohmmeter leads to the high tension terminal and to the ground ("GRD") terminal, and read secondary coil resistance on the ohmmeter.

3. Coils with secondary windings connected to primary winding (early type), connect the ohmmeter leads to high tension terminal and the primary (B +) "BAT" terminal, and read the coil resistance on the ohmmeter (Fig. 7).

NOTE: To avoid having to distinguish between early or late assembled coils, Delco-Remy suggests testing with the ohmmeter probe on both the "GRD" and the "BAT" terminals (Steps 2 & 3). Then, replace the coil only if both readings show infinite resistance or do not meet specifications.

If meter reads infinity, remove coil from cap and retest. There are two things to look for:

a. The contact button on the distributor cap has a resistance of 8,000 to 10,000 ohms.

b. There is a small coil spring between the cap and the coil. If the spring is missing, there will be an open circuit between the distributor cap button and the coil secondary contact.

CYLINDER LEAKAGE TEST

Cylinder Leakage Testing will point out exhaust and intake valve leaks, leaks between cylinders, or into the water jacket, or any other causes of compression loss.

The CCL-82 applies air to the cylinder at controlled volume and pressure, and measures the percentage of leakage.

ENGINE PREPARATION

1. Warm engine to normal operating temperature.

2. Stop engine, loosen all spark plugs approximately one turn to break free any accumulated carbon adjacent to the spark plugs.

3. Start engine, and accelerate to approximately 1000 rpm, to blow out loosened carbon.

4. Stop engine, and remove any foreign matter from around the spark plugs with compressed air.

5. Remove spark plugs and gaskets or tubes if used.

6. Remove air cleaner, and set carburetor throttle valve to wide open position.

7. Remove crankcase filler cap.

8. Remove radiator filler cap. If coolant level is low, fill to prescribed level.
9. Disconnect PCV system from crankcase or intake manifold.

Tester Calibration

1. Turn C.L.T. REGULATOR knob counterclockwise until it turns freely.
2. Connect shop air supply to CCL-82 CLT INLET PORT on back of tester.
3. Connect Tester extension hose to CYLINDER CONNECTOR fitting on front of CCL-82.
4. Turn C.L.T. REGULATOR knob clockwise until CYLINDER GAUGE reads "0."
5. Momentarily connect, then disconnect engine test adapter. (The pointer should return to "0." If not, readjust pressure regulator and recheck adjustment.)
6. Push Red locking ring down to secure the position of the C.L.T. REGULATOR.

Testing Cylinder Leakage

1. Install proper sized adapter in spark plug hole, finger-tight.
2. Attach whistle to adapter in the cylinder.
3. Disable ignition system per designated tester Operator's Manual.
4. Crank engine until whistle sounds. Continue to crank engine a slight amount at a time until whistle just stops whistling. Use ignition key or remote starter switch (#1438-2). This should position the piston to TDC.
5. Remove whistle and connect the chuck of the tester extension hose to the hose in the cylinder. Wait for the cylinder to fill with air and the gauge to reach its lowest reading.
6. Note and record the reading.
7. Listen at the crankcase breather, the tail pipe, and the carburetor, with the throttle plates wide open, for escaping air. Check radiator for bubbling.
8. Note where escaping air occurs.

Optional Test

Another test that can be performed to get a more complete cylinder picture is, compare the leakage with the piston at the top of the cylinder to the leakage with the piston at the bottom of the cylinder. If the leakage at the top of the cylinder is different than the leakage at the bottom of the cylinder, this indicates cylinder taper or scored cylinder walls.

Testing, With All Plugs Out

Since most engines tend to turn when air is applied to one cylinder with all of the spark plugs out, the engine must be positioned at TDC for the cylinder being tested in order to perform the test. This is done by slowly cranking the engine until the whistle just stops whistling.

Test Indications

NOTE: These specifications are just a guideline, and can be adjusted to meet operator's own situations.

The cylinder readings should be relatively even, within 10% of each other, and not more than 20% leakage in any one cylinder. If these conditions do not exist, determine where the excess leakage occurs.

Air escaping through the carburetor — leaking intake valve.

Air escaping through the tail pipe — leaking exhaust valve.

Air escaping from crankcase breather — leaking compression rings.

Air escaping from cylinder adjacent to one being tested — leaking head gasket, crack in block or head.

Air bubbling in radiator — leaking head gasket, cracked block or cracked cylinder head.

Air leaking in the radiator with piston at bottom of cylinder bore, but no air leaking in radiator at top of cylinder bore indicates a cracked block.

Sun ELECTRIC CORPORATION

3011 EAST ROUTE 176 · CRYSTAL LAKE, ILLINOIS 60014 · 815-459-7700